

### **Abstract**

A composite material (M) comprising: at least 75 % by volume of a mixed electronic conductor compound oxygen anions  $O^{2-}$  (C1) selected from doped ceramic compounds which, at the temperature of use, are present in the form of a crystalline network having ion oxide lattice vacancies and, more particularly, in the form of a cubic phase, a fluorite phase, a perovskite phase, of the aurivillius variety, a Brown - Millerite phase or a pyrochlore phase; and 0.01 % - 25 % by volume of a compound (C2) which is different from compound (C1), selected from oxide-type ceramic materials, non-oxide type ceramic materials, metals, metal alloys or mixtures of said different types of material; and 0 % - 2.5 % by volume of a compound (C3) produced from at least one chemical reaction represented by the equation:  $xFC_1 + yFC_2 \longrightarrow zFC_3$ , wherein  $FC_1$ ,  $FC_2$  and  $FC_3$  represent the raw formulae of compounds (C1), (C2) and (C3) and x, y and z represent rational numbers above or equal to 0. The invention also relates to a method for the preparation and use thereof as mixed conductor material for a membrane catalytic reactor used to synthesize synthetic gas by catalytic oxidation of methane or natural gas and/or as mixed conductor material for a ceramic membrane.